PATENT
Attorney Docket No. RIC01068

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

William Christopher Hardy

Serial No.: 10/084,013

Filed: February 27, 2002

For: METHOD AND SYSTEM FOR DETERMINING DROPPED FRAME RATES OVER A PACKET SWITCHED TRANSPORT

Group Art Unit: 2665

Examiner: Daniel J. Ryman

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APPEAL BRIEF

This Appeal Brief is submitted in triplicate in response to the final Office Action, dated January 27, 2004, and in support of the Notice of Appeal, mailed April 27, 2004 and received in the U.S. Patent and Trademark Office on April 29, 2004.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is MCI, Inc., formerly known as WorldCom, Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-38 are pending in this application.

Claims 1, 7-9, 22, 23 and 33-35 have been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Randic (U.S. Patent No. 6,275,797).

Claims 2-4, 11, 12, 14-19, 24-28 and 36 have been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Randic in view of Fitch (U.S. Patent No. 5,633,909).

Claims 10, 20, 29, 30 and 37 have been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Randic and Fitch in view of Newton ("Newton's Telecom Dictionary").

Claims 13, 21, 31, 32, and 38 have been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Randic, in view of Fitch, and further in view of Hardy (U.S. Patent No. 5,748,876).

Claims 5 and 6 are objected to as being dependent upon a rejected base claim, but would otherwise be allowable.

Claims 1-4 and 7-38 are the subject of the present appeal. These claims are reproduced in the Appendix of this Appeal Brief.

IV. STATUS OF AMENDMENTS

A Request for Reconsideration was filed subsequent to the final Office Action, dated January 27, 2004. A proposed amendment after final is being filed concurrently with this Appeal brief to improve the form of the claims. No substantive changes are proposed. The scope of the claims remains unchanged.

V. SUMMARY OF THE INVENTION

Systems and methods consistent with the invention detect dropped packets in a network including a packet switched network when there is no access to packet switch transmission control data that reliably detects dropped packets. Systems and methods may also detect dropped packets absent any knowledge of a packet loss concealment technique being used.

With reference to Fig. 1 and Appellant's specification at page 7, lines 4-16, a hybrid telecommunications network 1 is disclosed. Test system 10 is coupled to public switched telephone network (PSTN) 12. PSTN 12 is coupled to packet switched network 16 by gateway 14. PSTN 12' is coupled to packet switched network 16 by gateway 18. Test system 10' is coupled to PSTN 12'. Gateway 14 converts time division multiplexed (TDM) signals into packets that are compatible with packet switched network 16. Gateway 14 has access to a directory of IP addresses of exit gateways. Gateway 14 uses the directory to select gateway 18. Packet switched network 16 transports the packets to gateway 18. Gateway 18 converts the packets back into a TDM format compatible with

PSTN 12'. PSTN 12' routes the TDM signal to system 10'. Subsequently, test system 10 transmits a sequence of N test waveforms. System 10' receives the telephonic transmission via network 1, and determines if there are any dropped packets by processing the received waveforms to assign values associated with each waveform, and comparing the assigned values to a predetermined sequence of values. Deviations from the predetermined sequence reveal dropped packets. This arrangement provides a method for detecting dropped packets across a packet switched network without having access to packet transmission control data.

Fig. 2 and Appellant's specification at page 8, lines 3-15, describes an embodiment of test system 10 in detail. Test system 10 is coupled to network 1 by way of a telephone-line interface 42. Telephone-line interface 42 is bi-directionally coupled to codec 40. On the transmit side, a stored waveform is retrieved from memory (either RAM 102 or ROM 104) and provided to codec 40 via system bus 110. Codec 40 encodes the digitized sequence of N waveforms retrieved from memory into an analog signal suitable for insertion to the PSTN via a standard access loop. The encoded analog signal is provided to interface circuit 42 via the bi-directional connection, and transmitted over network 1. Each transmitted waveform is of a duration that matches the payload of a packet generated in a packet switched network 16 (See Figure 1). Thus, each transmitted waveform operates to assign a value to a packet carrying the transmitted waveform. Test system 10 also may function as a standard plain old telephone system (POTS) telephone set. In this mode, an A/D converter 32 receives voice generated analog signals from

telephone headset microphone circuit 34.

With reference to Appellant's specification, at page 8, line 16 through page 16, line 2, analog telephonic transmissions from network 1 are received from interface circuit 42 and provided to codec 40, which creates PCM encoded digital images of the analog signal that is stored in a file in RAM 102. The file includes a digital representation of each of the received waveforms. Processor 100 is programmed to process the stored file to extract the appropriate waveform characteristic for each of the N transmitted waveforms that are received. In one embodiment, processor 100 is programmed to determine the average peak power of each received waveform. The average peak power is converted to a numerical value representing its rank among the average peak powers calculated for the N received waveforms, thereby creating a sequence of received values. The sequence of received values is compared to the sequence of values representing the analogous ranks of the average peak powers among the transmitted set of N waveforms. Since each transmitted waveform operates to assign a value to a packet carrying the transmitted waveform, the sequence of received values indicates which packets successfully traversed the packet switched network 16.

In other embodiments, other characteristics of waveforms may be used to distinguish waveforms from one another. For example, the characteristic may be average signal power, peak power, frequency, a number of phase changes per waveform segment, a Code Excited Linear Prediction (CELP) waveform symbol, a bit pattern reflected in a semantically encoded waveform, or any other means of encoding a distinctive

characteristic in a waveform (see specification at page 10, lines 23-27).

In one embodiment, each waveform includes two waveform segments. A first segment is a sinusoidal wave transmitted at a minimum peak power close to a noise floor and a second segment is a sinusoidal wave transmitted at one of N equally spaced power levels (see specification at page 11, lines 2-5).

During post processing, in another embodiment, the received transmission is divided into waveform sections having a duration substantially equal to each of the transmitted waveforms, i.e., the duration of a voice sample in a packet transmitted across packet switched network 16 (see specification at page 11, lines 14-17). A value is assigned to each waveform. A missing section value corresponds to a dropped packet without concealment (see specification at page 11, lines 22-25 and steps 418-419 of Fig. 3). A repeated section value corresponds to a dropped packet with concealment (see specification at page 11, lines 24-25 and steps 422-424 of Fig. 3).

VI. GROUPING OF CLAIMS

Appellant is satisfied to let claims 1-4 and 7, 8 and 10-33 stand or fall together. Appellant elects claim 1 as representative of the group.

Claims 9 and 34-38 do not stand or fall together with any of the other claims for the reasons discussed in the Argument section below.

VII. ISSUES

A. Whether claims 1, 7-9, 22, 23 and 33-35 are unpatentable over Randic (U.S. Patent No. 6,275,797);

B. Whether claims 2-4, 11, 12, 14-19, 24-28 and 36 are unpatentable over Randic in view of Fitch (U.S. Patent No. 5,633,909); and

C. Whether claims 10, 20, 29, 30 and 37 are unpatentable over Randic and Fitch in view of Newton ("Newton's Telecom Dictionary").

D. Whether claims 13, 21, 31, 32, and 38 are unpatentable over Randic, in view of Fitch, and further in view of Hardy (U.S. Patent No. 5,748,876).

VIII. ARGUMENT

A. The rejection of claims 1, 7-9, 22, 23 and 33-35 under 35 U.S.C. § 103(a) as unpatentable over Randic (U.S. Patent No. 6,275,797) should be REVERSED.

Claims 1, 7-9, 22, 23 and 33-35 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over Randic.

As stated above with regard to the groupings of the claims, claim 1 is representative of the group of claims including claims 1, 7 and 8; and claim 22 is representative of the group of claims including claims 22 and 23.

The initial burden of establishing a prima facie basis to deny patentability to a claimed invention is always upon the Examiner. In re Oetiker, 977 F.2d 1443, 24

USPQ2d 1443 (Fed. Cir. 1992). In rejecting a claim under 35 U.S.C. § 103, the Examiner must provide a factual basis to support the conclusion of obviousness. In re Warner, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967). Based upon the objective evidence of record, the Examiner is required to make the factual inquiries mandated by Graham v. John Deere Co., 86 S.Ct. 684, 383 U.S. 1, 148 USPQ 459 (1966). The Examiner is also required to explain how and why one having ordinary skill in the art would have been led to modify an applied reference and/or combine applied references to arrive at the claimed invention. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

With these principles in mind, independent claim 1 recites a combination of features of a method for detecting dropped packets in a network including a packet switched network. The method includes establishing a telephonic connection between a first network location and a second network location; transmitting at least one set of N waveforms from the first network location, wherein each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms; receiving at least one telephonic signal at the second network location via a communications channel; processing the at least one telephonic signal to obtain a received sequence of values; and comparing the received sequence of values to the predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network

control data.

Randic does not disclose or suggest this claimed combination of features. For example, Randic does not disclose or suggest transmitting at least one set of N waveforms from the first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms.

On page 10 of the final Office Action, dated January 27, 2004, the Examiner alleged that Randic discloses transmitting at least one set of N waveforms from the first network location, wherein each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms. The Examiner relied on Randic at column 3, lines 50-61 and column 6, lines 20-43 to support this allegation. Appellant respectfully disagrees.

Randic at column 3, lines 50-61 discloses:

> Computers 14, 16, and 18 include an Automatic Voice Recognition ("AVR") system 24. The AVR system 24 recognizes speech in the digitized voice data packets provided in the voice test file 23 received at input terminals 15. The AVR system 24 compares the speech patterns in the transmitted voice test files 17A, 17B, and 17C with speech patterns of the voice test file 23 previously stored in the receiving computers 14, 16, and 18. The result of this comparison is voice path quality factors 27A, 27B and 27C. The AVR system 24 converts the digitized voice data packet received to speech and vice versa using one of the above-mentioned voice recognition software programs.

Thus, Randic discloses a speech recognition system that recognizes speech in

received digitized voice data packets. The speech recognition system compares the transmitted speech patterns with the received speech patterns. Nowhere in this section, or elsewhere, does Randic disclose or suggest transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 1.

Randic at column 6, lines 20-43 discloses:

> An example of test method steps 46, 48, 50, and 51 is detailed in the block diagram shown in FIG. 4. Voice test file 23 is provided to AVR system 24. Voice test file 23 is interpreted by AVR system 24 to include the sentence "This is a test." Voice test file 17 is received at input terminal 15 of computer 14 and processed by AVR system 24. AVR system 24 recognizes the received voice test file 17 as the sentence "This is a beach." The interpreted voice test file 23 in file 54 is compared to the interpreted received voice test file 17 in file 52 by processor 40 in computer 14.
>
> A voice path quality factor 27 is generated, in this example, by comparing the number of matching words in files 52 and 54. Since there are 3 matching words between the sentences "This is a test" and "This is a beach," the voice path quality factor is 3. Alternatively, voice path quality factor 27 can be expressed as a percentage of matching words or 75% in this example (3 out of 4 matching words).
>
> Voice path quality factor 27 is an objective indicator of the quality of transmission and processing of the voice path under test, like voice path 20. Speech recognition is only one of a variety of properties associated with voice communication, however, speech recognition can be used as a basic measurement of the goodness of the voice path under test.

Randic discloses that a previously stored voice test file (i.e., transmitted speech patterns) may be interpreted by the voice recognition program to include a sentence, such

as, "This is a test." The received voice test file may be interpreted by the voice recognition software to include a sentence, such as, "This is a beach." Randic discloses a voice path quality factor that can be expressed as a percentage of matching words. In the above example, the voice path quality factor is 75%. Nowhere in this section, or elsewhere, does Randic disclose or suggest transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 1.

The Examiner alleged that Randic discloses transmitting at least one set of N waveforms and cited Randic at column 3, lines 53-57 (see Office Action of January 27, 2004, page 2).

Randic at column 3, lines 53-57 discloses:

> The AVR system 24 compares the speech patterns in the transmitted voice test files 17A, 17B, and 17C with speech patterns of the voice test file 23 previously stored in the receiving computers 14, 16, and 18.

The Examiner argued that the transmitted voice file contains at least one set of N waveforms (See Office Action of January 27, 2004, page 2). Appellant disagrees. Even if the transmitted voice file contains at least one set of N waveforms (a point which Appellant does not concede), this is not equivalent to transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other

waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 1. Therefore, contrary to the Examiner's allegation, the transmitted voice file containing at least one set of N waveforms cannot be equivalent to transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 1.

On page 10 of the final Office Action, the Examiner alleged that it is implicit that each waveform has a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set since each waveform is distinguishable from the other waveforms in the set and where the predetermined sequence of values is set by the reception order to the file (i.e., "This is a test."). Appellant respectfully disagrees. Even if one assumes that that each of the waveforms has a value (a point which Appellant does not concede), Randic does not disclose or suggest that each waveform has a characteristic operative to assign a predetermined value to the waveform relative to other waveforms in the at least one set of N waveforms.

Further, Randic does not disclose or suggest comparing the received sequence of values to the predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data, as also recited in claim 1.

On page 10 of the Office Action, the Examiner alleged that Randic disclosed

comparing the received sequence of values to the predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data, as recited in claim 1. The Examiner relied on Randic at column 5, line 23 through column 6, line 43 to support this allegation.

Randic at column 5, line 23 through column 6, line 43 discloses:

> Voice test file 17 is received by computer 14, 16, or 18, respectively, depending on which voice path is under test. Several systems and processes along the voice path under test may alter the voice test file 23 sent by computer 12 from the voice test file 17 actually received by computers 14, 16 or 18. Alteration of the voice test file 23 can occur during compression, encapsulation or packetization, packet transport, decompression, and decapsulation or depacketization. For example, end-point acoustic environments including the acoustic spaces in which the connection is terminated and electromechanical transducers including any devices which convert electrical signals to or from acoustic waveforms. Furthermore, signal processing transformations including any devices or algorithms which transform the representation of a signal including speech compression and echo cancellation algorithms and packet transmission media which include devices and protocols which package, temporarily store, route, and carry signal representations between two physical locations may also alter the received version of voice test file 23.
>
> These systems and signal transformations often result in voice test file 23 missing data packets. When this happens, there is no time available to request resending of the lost data packets. Thus, the data packet is altered when received by receiving computer 14, 16, or 18.
>
> Each network processing node along the communication link established in the WAN 11 can have some impact on the perceived voice quality of the connection. In many cases, these impacts are independent between network processing nodes, but some dependencies do exist. For example, the performance of signal processing algorithms are often affected by the quality of the acoustic environment in which the initial voice test file is generated or recorded.
>
> Even when independent, however, these impairments are generally cumulative along the communication link. These impairments may also be

subjectively linked together. For example, long propagation delays introduced in a packet transmission medium can increase the perceptibility of an echo caused by a hybrid mismatch between a telephone and its line interface at the other end of the connection. By themselves, both the echo and propagation delay might not be perceptible, but together, they increase subjective noticeability of the echo. Moreover, impairments can affect the transmission of individual voice data packets.

At step 45, the received voice test file 17 is fed into AVR system 24. At step 46, the received voice test file 17 is processed by AVR system 24. AVR system 24 recognizes speech patterns in the transmitted voice test file 17 at step 46. Voice test file 23 is provided to the receiving computers 14,16, or 18 at step 47. As with the transmitted voice test file 17, voice test file 23 is fed into AVR system 24 at step 49 and is processed by AVR system 24 at step 50.

AVR system 24 recognizes speech patterns in both the originally sent voice test file 23 and the transmitted voice test file 17 and compares, at step 48, the interpreted speech patterns in transmitted test file 17 with the speech patterns of the originally sent voice test file 23. The comparison of the received speech patterns in test file 17 with voice test file 23 preferably includes determining the number of matching letters, words, or sentences between transmitted voice file 17 and stored voice test file 23. The comparison of both of these files generates a voice path quality factor 27 at step 52.

An example of test method steps 46, 48, 50, and 51 is detailed in the block diagram shown in FIG. 4. Voice test file 23 is provided to AVR system 24. Voice test file 23 is interpreted by AVR system 24 to include the sentence "This is a test." Voice test file 17 is received at input terminal 15 of computer 14 and processed by AVR system 24. AVR system 24 recognizes the received voice test file 17 as the sentence "This is a beach." The interpreted voice test file 23 in file 54 is compared to the interpreted received voice test file 17 in file 52 by processor 40 in computer 14.

A voice path quality factor 27 is generated, in this example, by comparing the number of matching words in files 52 and 54. Since there are 3 matching words between the sentences "This is a test" and "This is a beach," the voice path quality factor is 3. Alternatively, voice path quality factor 27 can be expressed as a percentage of matching words or 75% in this example (3 out of 4 matching words).

> Voice path quality factor 27 is an objective indicator of the quality of transmission and processing of the voice path under test, like voice path 20. Speech recognition is only one of a variety of properties associated with voice communication, however, speech recognition can be used as a basic measurement of the goodness of the voice path under test.

The speech patterns disclosed by Randic do not include waveform characteristics operative to assign a predetermined value relative to other waveforms. Randic does not disclose such predetermined values. Therefore, Randic cannot disclose or suggest comparing the received sequences of values to the predetermined sequence of transmitted values, as required by claim 1.

Accordingly, it is respectfully submitted that independent claim 1 is patentable over Randic. Reversal of the rejection is respectfully requested.

Further, speech may vary in terms of amplitude, phase, and duration. Therefore, speech recognizers are not sensitive to many such variations. In addition, if a voice packet is dropped, voice may be dropped for a small fraction of a second. Speech recognizers, generally, are not sensitive to such a small period of dropped voice and are therefore, not suitable for detecting dropped packets.

Claim 9 depends from claim 1 and is, therefore, patentable over Randic for at least the reasons given with regard to claim 1. Claim 9 is also patentable for reasons of its own. Claim 9 recites that each predetermined value includes a predetermined bit pattern. The Examiner alleged that Randic discloses the feature of claim 9 at column 4, lines 31-67 (Office Action at page 11). Appellant disagrees.

Randic at column 4, lines 31-67 discloses:

> The operation of communication networks 10 and 30 shown in FIGS. 1 and 2 will be described with reference to FIG. 3. Voice test file 23, as mentioned above, is generated by a computer at step 40. Voice test file 23 contains common reference voice patterns or speech characteristics that test the integrity of voice paths 20, 21, 22, 35, 37. For example, voice test file 23 can include long sentences that segment the test file 23 over a wide variety of different paths inside the WAN 11. Before voice test file 23 is transmitted through a corresponding voice path under test, voice test file 23 is compressed and encapsulated at step 41.
>
> At step 42, voice test file 23 is transmitted to a receiving computer through the voice path under test. For example, if voice path 20 between computer 12 and computer 14 is tested, voice test file 23 is sent from computer 12 to receiving computer 14. If voice path 35 between subscriber 33 and subscriber 34 is tested, the voice test file 23 is sent from subscriber 33 to subscriber 34 through provider 32A. It should be apparent to a person skilled in the art that voice test file 23 can be sent simultaneously from computer 12 to receiving computers 14, 16, and 18 thereby simultaneously testing the voice path 21, 22, and 23. The sending and receiving computers can also be switched with anyone or all of computers 14,16, and 18 sending voice test files 23 to computer 12.
>
> Step 41 includes generating the digitized voice data. Digitized voice is a continuous stream of data that is compressed and packetized before being sent through the packet network. Different methods having different properties exist for compressing and encapsulating data at the sending computer 12. Once data has been compressed and encapsulated using a selected protocol, the data is transported between network nodes at step 42 on its way to the receiving computer 14, 16, or 18 at step 44. For an average coast to coast voice communication over the IP packet network, there are approximately 22 hops between different networks nodes, e.g., routers.

Randic discloses that voice test file 23 contains common reference voice patterns or speech characteristics. As mentioned above, voice or speech patterns do not include waveform characteristics operative to assign a predetermined value relative to other waveforms. Thus, Randic cannot disclose or suggest that each predetermined value includes a predetermined bit pattern, as required by claim 9. Further, voice patterns do

not require a particular bit pattern. In fact, a number of bit patterns may match a common reference voice pattern. Therefore, Appellant submits that claim 9 is patentable over Randic and, therefore, reversal of the rejection is respectfully requested.

Claim 34 recites a computer-readable medium having computer-executable instructions for performing a method. The method includes: establishing a telephonic connection between a first network location and a second network location, and transmitting at least one set of N waveforms from the first network location, each transmitted waveform including a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms.

Randic does not disclose or suggest transmitting at least one set of N waveforms from the first network location, each transmitted waveform including a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 34.

On page 10 of the final Office Action, dated January 27, 2004, the Examiner alleged that Randic discloses transmitting at least one set of N waveforms from the first network location, wherein each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N

transmitted waveforms. The Examiner relied on Randic at column 3, lines 50-61 and column 6, lines 20-43 to support this allegation. Appellant respectfully disagrees.

Randic at column 3, lines 50-61 discloses:

> Computers 14, 16, and 18 include an Automatic Voice Recognition ("AVR") system 24. The AVR system 24 recognizes speech in the digitized voice data packets provided in the voice test file 23 received at input terminals 15. The AVR system 24 compares the speech patterns in the transmitted voice test files 17A, 17B, and 17C with speech patterns of the voice test file 23 previously stored in the receiving computers 14, 16, and 18. The result of this comparison is voice path quality factors 27A, 27B and 27C. The AVR system 24 converts the digitized voice data packet received to speech and vice versa using one of the above-mentioned voice recognition software programs.

Thus, Randic discloses a speech recognition system that recognizes speech in received digitized voice data packets. The speech recognition system compares the transmitted speech patterns with the received speech patterns. Nowhere in this section, or elsewhere, does Randic disclose or suggest transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 34.

Randic at column 6, lines 20-43 discloses:

> An example of test method steps 46, 48, 50, and 51 is detailed in the block diagram shown in FIG. 4. Voice test file 23 is provided to AVR system 24. Voice test file 23 is interpreted by AVR system 24 to include the sentence "This is a test." Voice test file 17 is received at input terminal 15 of computer 14 and processed by AVR system 24. AVR system 24 recognizes the received voice test file 17 as the sentence "This is a beach." The interpreted voice test file 23 in file 54 is compared to the interpreted

> received voice test file 17 in file 52 by processor 40 in computer 14.
>
> A voice path quality factor 27 is generated, in this example, by comparing the number of matching words in files 52 and 54. Since there are 3 matching words between the sentences "This is a test" and "This is a beach," the voice path quality factor is 3. Alternatively, voice path quality factor 27 can be expressed as a percentage of matching words or 75% in this example (3 out of 4 matching words).
>
> Voice path quality factor 27 is an objective indicator of the quality of transmission and processing of the voice path under test, like voice path 20. Speech recognition is only one of a variety of properties associated with voice communication, however, speech recognition can be used as a basic measurement of the goodness of the voice path under test.

Randic discloses that a previously stored voice test file (i.e., transmitted speech patterns) may be interpreted by the voice recognition program to include a sentence, such as, "This is a test." The received voice test file may be interpreted by the voice recognition software to include a sentence, such as, "This is a beach." Randic discloses a voice path quality factor that can be expressed as a percentage of matching words. In the above example, the voice path quality factor is 75%. Nowhere in this section, or elsewhere, does Randic disclose or suggest transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 1.

The Examiner alleged that Randic discloses transmitting at least one set of N waveforms and cited Randic at column 3, lines 53-57 (see Office Action of January 27, 2004, page 2).

Randic at column 3, lines 53-57 discloses:

> The AVR system 24 compares the speech patterns in the transmitted voice test files 17A, 17B, and 17C with speech patterns of the voice test file 23 previously stored in the receiving computers 14, 16, and 18.

The Examiner argued that the transmitted voice file contains at least one set of N waveforms (See Office Action of January 27, 2004, page 2). Appellant disagrees. Even if the transmitted voice file contains at least one set of N waveforms (a point which Appellant does not concede), this is not equivalent to transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 34. Therefore, contrary to the Examiner's allegation, the transmitted voice file containing at least one set of N waveforms cannot be equivalent to transmitting at least one set of N waveforms from a first network location, where each transmitted waveform includes a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms, as required by claim 34.

On page 10 of the final Office Action, the Examiner alleged that it is implicit that each waveform has a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set since each waveform is distinguishable from the other waveforms in the set and where the predetermined sequence of values is

set by the reception order to the file (i.e., "This is a test."). Appellant respectfully disagrees. Even if one assumes that that each of the waveforms has a value (a point which Appellant does not concede), Randic does not disclose or suggest that each waveform has a characteristic operative to assign a predetermined value to the waveform relative to other waveforms in the at least one set of N waveforms. Appellants, therefore, respectfully requests reversal of the rejection of claim 34.

Claim 35 recites a computer-readable medium having computer-executable instructions for performing a method. The method includes: receiving at least one telephonic signal at the second network location via the communications channel; processing the at least one telephonic signal to obtain a received sequence of values; and comparing the received sequence of values to a predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data.

Appellant submits that Randic does not disclose or suggest comparing the received sequence of values to a predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data, as required by claim 35.

On page 10 of the Office Action, the Examiner argued that Randic, at column 5, line 23 through column 6, line 43 discloses this feature. Randic discloses comparing speech patterns of a transmitted file with speech patterns of a received file. Variability exists in speech patterns. Otherwise, one would be required to say words in exactly one

way for a speech recognizer to recognize speech. Therefore, the speech patterns disclosed in Randic cannot contain a predetermined sequence of transmitted values. Consequently, Randic cannot disclose or suggest comparing the received sequence of values to a predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data, as required by claim 35. Appellant, therefore, respectfully requests reversal of the rejection of claim 35.

Further, as mentioned above, with respect to claim 1, because speech may vary in terms of amplitude, phase, and duration, speech recognizers are not sensitive to many such variations. In addition, if a voice packet is dropped, voice may be dropped for a small fraction of a second. Speech recognizers, generally, are not sensitive to such a small period of dropped voice and are therefore, not suitable for detecting dropped packets.

B. The rejection of claims 2-4, 11, 12, 14-19, 24-28, and 36 under 35 U.S.C. § 103(a) as unpatentable over Randic (U.S. Patent No. 6,275,797) in view of Fitch (U.S. Patent No. 5,633,909) should be REVERSED.

Claims 2-4, 11, 12, 14-19, 24-28, and 36 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over Randic in view of Fitch.

Claims 2-4, 11, 12, 14-19 and 24-28 are grouped with claim 1. Appellant submits that Fitch fails to satisfy the deficiencies of Randic with respect to claim 1.

Regarding the rejection of claim 36, in establishing motivation, it has been consistently held that the requisite motivation to support the conclusion of obviousness is not an abstract concept, but must stem from the prior art as a whole to impel one having ordinary skill in the art to modify a reference or combine references with a reasonable expectation of successfully achieving some particular realistic objective. See, for example, Interconnect Planning Corp. v. Feil, 227 F.2d 1132, 227 USPQ 543 (Fed. Cir. 1985). Consistent legal precedent admonishes against the indiscriminate combination of prior art references. Carella v. Starlight Archery, 804 F.2d 135, 231 USPQ 644 (Fed. Cir. 1986); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985).

The Examiner alleges that Randic, at column 6, lines 36-43, discloses that speech recognition is only one of a variety of properties of voice communication. Randic, at column 6, lines 36-63 states:

> Voice path quality factor 27 is an objective indicator of the quality of transmission and processing of the voice path under test, like voice path 20. Speech recognition is only one of a variety of properties associated with voice communication, however, speech recognition can be used as a basic measurement of the goodness of the voice path under test.

Randic discloses that speech recognition is one of a number of properties associated with voice communications, but does not disclose what the other properties are.

Randic is concerned with measuring voice path quality in a communication network (see Randic, Abstract and column 1, lines 8-11). Although Randic discloses that

there are a number of properties associated with voice communications, Randic discloses that the quality of voice transmission has advantages over other parameters. Randic discloses, at column 6, line 44 to column 7, line 6:

> The resulting voice path quality factor 27 has several advantages over other parameters which measure the quality of voice transmission over a communication network. First, voice path quality factor 27 is reproducible, objective, and suitable for automated system level test because it does not involve human interaction. Second, voice path quality factor 27 is easily evaluated because it can be given a numeric value such as the percentage of matching words or sentences between voice test file 23 and the interpreted voice patterns. Finally, less specialized knowledge and time is required to generate voice path quality factor 27 because readily available off the shelf programs can be used after slight modifications in AVR system 24. For example, many off the shelf programs include a learning capability that improves the system's ability to recognize speech in subsequently received voice files. In order to ensure measurement reproducibility, this learning capability must be removed or reduced because it may affect the objectivity and reproducibility of the results after each iteration of speech recognition.
>
> Voice path quality factor 27 has immediate benefits including feedback of the quality of the voice path under test. Voice path quality factor 27 can be used to fine tune and condition communication networks 10 and 30 to achieve the targeted voice quality. Voice path quality factor 27 can also be used to determine a threshold level of voice path operation during the system level test in the design and manufacturing phase of communication networks 10 and 30. Additionally, voice quality factor 27 can be used to develop the network node packet queueing or prioritizing algorithms.

Thus, Randic discloses numerous advantages of using a voice path quality factor, such as reproducibility, objectivity, suitability for automated testing, can be easily evaluated, requires less specialized knowledge and time to generate voice path quality factor, and availability of voice recognition software.

Fitch discloses a system for generating calls and testing telephone equipment. Calls are generated and messages are sent to voice mailboxes. The voice mailboxes are accessed and the delivered message is compared with the retrieved message (see Abstract). Fitch is concerned with testing the functioning of telephony equipment including voice mail systems, interactive messaging systems, private branch exchange (PBX) systems, and other telephonic systems (see Fitch at column 1, lines 10-14). Fitch discloses verifying that a retrieved message is substantially identical to a delivered message (see Fitch at column 6, lines 54-59). However, Fitch is not concerned with packet loss or signal distortion that may occur in a voice communication network. Fitch is only concerned with testing equipment, such as a verifying proper message storage to and proper message retrieval from a voice messaging system. Fitch does not disclose testing voice communications via a network. The call generator of Fitch is directly connected to a system under test. A network may be used to provide the call generator with access to test cases, documents, and other information stored in remote locations, but voice communications between the call generator and the system under test do not occur via a network. Therefore, Fitch is not concerned with dropped data packets through a packet switched network or with a loss of voice quality.

Because Randic is concerned with providing an indicator of voice path quality through a network and because Randic states that a voice path quality factor has several advantages over other parameters which measure the quality of voice transmission via a network (see Randic at column 6, lines 44-46) one of ordinary skill in the art would not

be motivated to combine Randic with Fitch, which is not concerned with voice path quality or data loss through a network.

The Examiner indicated, on page 12 of the final Office Action, that the motivation for combining Randic and Fitch includes official notice that peak-power and average power are two well-known power measurements and that the combination would eliminate the need for voice recognition software. However, Randic is concerned with measuring voice quality and states that having a voice quality factor has advantages over other parameters which measure the quality of voice via a network. Further, as explained above, some data loss is expected in a voice communication network and voice communication networks can tolerate some amount of data loss. Fitch is not concerned with the problems of voice communications or data loss through a network, but only with the functioning of telephony equipment. Therefore, Appellant submits that one of ordinary skill in the art would not be motivated to combine Randic with Fitch. For at least this reason, Appellant respectfully requests that the rejection of claim 36 be reversed.

C. The rejection of claims 10, 20, 29, 30, and 37 under 35 U.S.C. § 103(a) as unpatentable over Randic (U.S. Patent No. 6,275,797) in view of Fitch (U.S. Patent No. 5,633,909) and further in view of Newton ("Newton's Telecom Dictionary") should be REVERSED.

Claims 10, 20, 29, 30, and 37 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over Randic in view of Fitch and further in view of Newton.

Claims 10, 20, 29, 30 are grouped with claim 1. Appellant submits that Fitch and Newton fail to satisfy the deficiencies of Randic.

With respect to claim 37, at least for the reasons discussed above with respect to claim 36, one of ordinary skill in the art would not be motivated to combine Randic and Fitch. Newton merely provides a definition for CELP. Appellant submits that a mere definition of CELP would not provide the missing motivation to combine Randic with Fitch and Newton.

On page 16 of the final Office Action, the Examiner provides the following additional motivation for combining Newton with Randic and Fitch:

> Newton discloses that CELP is a well-known coding technique, used when converting analog signals into digital signals, that compresses the signal by representing the data as a code index number. As such, in CELP the "data transmitted across the network are only the index number of [a] selected code description." It would have been obvious to one of ordinary skill in the art at the time of the invention to use a CELP symbol as the waveform characteristic since CELP symbols distinguish each waveform and thus would be useful in comparing two waveforms where this results in voice recognition software not being needed.

As discussed above, with respect to the lack of motivation to combine Randic and Fitch, Randic states that having a voice path quality factor has several advantages over other parameters which measure voice quality (see Randic at column 6, lines 44-46). For at least this reason, as well as the reasons provided with respect to the lack of motivation to combine Randic and Fitch, one of ordinary skill in the art would not be motivated to

eliminate the need for voice recognition software, as suggested by the Examiner. The Examiner, therefore, failed to provide proper motivation to combine Randic, Fitch, and Newton.

D. The rejection of claims 13, 21, 31, 32, and 38 under 35 U.S.C. § 103(a) as unpatentable over Randic (U.S. Patent No. 6,275,797) in view of Fitch (U.S. Patent No. 5,633,909) and further in view of Hardy (U.S. Patent No. 5,633,909) should be REVERSED.

Claims 13, 21, 31, 32, and 38 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over Randic in view of Fitch and further in view of Hardy.

Claims 13, 21, 31, and 32 are grouped with claim 1. Appellant submits that Fitch and Hardy fail to satisfy the deficiencies of Randic.

With respect to claim 38, Appellant submits that, at least for the reasons discussed above regarding claims 36 and 37, one of ordinary skill in the art would not be motivated to combine Randic and Fitch.

On page 19 of the final Office Action, the Examiner provides the following additional motivation for combining Hardy with Randic and Fitch:

> Hardy discloses that semantic waveforms contain "pre-selected bit patterns" (col. 3, lines 15-27). Thus, it would have been obvious to one of ordinary skill in the art to compare each received waveform section to a plurality of semantically encoded waveform patterns; assign a bit-pattern to the received waveform section based on the step of comparing each received waveform section, to thereby obtain the received sequence of values where this results in voice recognition software not being needed.

As discussed above, with respect to the lack of motivation to combine Randic and Fitch, Randic states that having a voice path quality factor has several advantages over other parameters which measure voice quality (see Randic at column 6, lines 44-46). For at least this reason, as well as the reasons provided with respect to the lack of motivation to combine Randic and Fitch, one of ordinary skill in the art would not be motivated to eliminate the need for voice recognition software, as suggested by the Examiner. The Examiner, therefore, failed to provide proper motivation to combine Randic, Fitch, and Hardy.

For at least the reasons given above, Appellant respectfully requests that the rejection of claim 38 be reversed.

IX. CONCLUSION

In view of the foregoing arguments, Appellant respectfully solicits the Honorable Board to reverse the Examiner's rejection of claims 1-4 and 7-38 under 35 U.S.C. § 103.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 13-2491 and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPENDIX

1. A method for detecting dropped packets in a network including a packet switched network, the method comprising:

establishing a telephonic connection between a first network location and a second network location;

transmitting at least one set of N waveforms from the first network location, each transmitted waveform including a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms;

receiving at least one telephonic signal at the second network location via the communications channel;

processing the at least one telephonic signal to obtain a received sequence of values; and

comparing the received sequence of values to the predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data.

2. The method of claim 1, wherein the representative waveform characteristic is a peak power level.

3. The method of claim 1, wherein the representative waveform characteristic is an average power level.

4. The method of claim 1, wherein each waveform in the set of N waveforms includes a representative waveform characteristic corresponding to one of N peak power levels.

7. The method of claim 1, wherein each waveform includes a first segment and a second segment.

8. The method of claim 7, wherein the second segment includes the representative waveform characteristic.

9. The method of claim 1, wherein each predetermined value includes a predetermined bit pattern.

10. The method of claim 1, where in the representative waveform characteristic is a waveform corresponding to a CELP symbol.

11. The method of claim 1, wherein the representative waveform characteristic includes a frequency of the waveform.

12. The method of claim 1, wherein the representative waveform characteristic includes a number of phase changes present in a segment of the waveform.

13. The method of claim 1, wherein the representative waveform characteristic includes a semantically encoded waveform.

14. The method of claim 1, wherein the step of processing includes the step of dividing the at least one telephonic signal into received waveform sections having a duration substantially identical to the transmitted waveform.

15. The method of claim 14, wherein the step of processing further comprises:

analyzing each received waveform section to extract a received waveform characteristic;

assigning each received waveform section a received value based on the received waveform characteristic; and

generating a sequence of received values based on the step of assigning to obtain the received sequence of values.

16. The method of claim 15, wherein a deviation between the predetermined sequence of values and the sequence of section values corresponds to a dropped packet.

17. The method of claim 16, wherein a deviation between the predetermined sequence of values and the sequence of section values includes a missing section value, the missing section value corresponding to a dropped packet.

18. The method of claim 16, wherein a deviation between the predetermined sequence of values and the sequence of section values includes a repetition of at least one section value, the repetition corresponding to a dropped packet.

19. The method of claim 16, wherein a deviation between the predetermined sequence of values and the sequence of section values includes a repetition of at least one section value, the repetition indicating a packet loss concealment routine operating in the packet switched network.

20. The method of claim 14, wherein the step of processing further comprises:

comparing each received waveform section to a plurality of CELP waveform patterns;

assigning a symbol number to the received waveform section based on the step of comparing each received waveform section; and

generating a sequence of received values using the symbol numbers of the received waveform sections, to thereby obtain the received sequence of values.

21. The method of claim 14, wherein the step of processing further comprises:

comparing each received waveform section to a plurality of semantically encoded waveform patterns;

assigning a bit-pattern to the received waveform section based on the step of comparing each received waveform section; and

generating a sequence of section values using the bit-pattern of the received waveform sections, to thereby obtain the received sequence of values.

22. A system for detecting dropped packets in a telecommunications network including a packet switched network, the system comprising:

a transmission unit configured to send at least one set of N waveforms over the telecommunications network, each transmitted waveform including a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms; and

a receiver unit operative to receive a telephonic signal from the telecommunications network, the receiver also being configured to derive a received sequence of values from the telephonic signal, and compare the received sequence of values to the predetermined sequence of values to detect dropped packets, without having access to packet switched network transmission control data.

23. The system of claim 22, wherein the transmission unit further comprises:

a computer-readable medium for storing data representing the at least one set of N waveforms;

a processor coupled to the computer readable medium, the processor being programmed to retrieve the data from the computer readable medium; and

a codec device for converting the data into a signal suitable for transmission over the telecommunications network.

24. The system of claim 22, wherein the receiver unit further comprises:

a computer-readable medium;

a codec device for converting a received telephonic signal into digitized data suitable for storing in a file in the computer-readable medium; and

a processor programmed to,

divide the digitized data in the file into received waveform sections,

analyze each received waveform section to extract a received waveform characteristic,

assign each received waveform section a received value based on the received waveform characteristic, and

generate a sequence of received values based on the step of assigning, to thereby obtain the received sequence of values.

25. The method of claim 24, wherein a deviation between the predetermined sequence of values and the sequence of section values corresponds to a dropped packet.

26. The method of claim 25, wherein a deviation between the predetermined sequence of values and the sequence of section values includes a missing section value, the missing section value corresponding to a dropped packet.

27. The method of claim 24, wherein a deviation between the predetermined sequence of values and the sequence of section values includes a repetition of at least one section value, the repetition corresponding to a dropped packet.

28. The method of claim 24, wherein a deviation between the predetermined sequence of values and the sequence of section values includes a repetition of at least one section value, the repetition indicating a packet loss concealment routine operating in the packet switched network.

29. The system of claim 24, wherein the processor is further configured to:

compare each received waveform section to a plurality of CELP waveform patterns;

assign a symbol number to the received waveform section based on the step of comparing each received waveform section; and

generate a sequence of section values using the symbol numbers of the received waveform sections.

30. The system of claim 29, wherein a section waveform characteristic is a waveform corresponding to a CELP symbol.

31. The system of claim 24, wherein the signal processor is further configured to:

compare each received waveform section to a plurality of semantically encoded waveform patterns;

assign a bit-pattern to the received waveform section based on the step of comparing each received waveform section; and

generate a sequence of section values using the bit-pattern of the received waveform sections.

32. The system of claim 31, wherein a section waveform characteristic is a semantically encoded waveform.

33. A computer-readable medium having computer-executable instructions for performing a method, the method comprising:

transmitting at least one set of N waveforms from the first network location, each transmitted waveform including a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms;

receiving at least one telephonic signal at the second network location via the communications channel;

processing the at least one telephonic signal to obtain a received sequence of values; and

comparing the received sequence of values to the predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data.

34. A computer-readable medium having computer-executable instructions for performing a method, the method comprising:

establishing a telephonic connection between a first network location and a second network location; and

transmitting at least one set of N waveforms from the first network location, each transmitted waveform including a waveform characteristic operative to assign a predetermined value relative to other waveforms in the at least one set, such that a predetermined sequence of values are assigned to packets carrying the N transmitted waveforms.

35. A computer-readable medium having computer-executable instructions for performing a method, the method comprising:

receiving at least one telephonic signal at the second network location via the communications channel;

processing the at least one telephonic signal to obtain a received sequence of values; and

comparing the received sequence of values to the predetermined sequence of transmitted values to detect dropped packets without having access to packet switched network control data.

36. The method of claim 35, wherein the step of processing further comprises:

analyzing each received waveform section to extract a received waveform characteristic;

assigning each received waveform section a received value based on the received waveform characteristic; and

generating a sequence of received values based on the step of assigning to obtain the received sequence of values.

37. The method of claim 35, wherein the step of processing further comprises:

comparing each received waveform section to a plurality of CELP waveform patterns;

assigning a symbol number to the received waveform section based on the step of comparing each received waveform section; and

generating a sequence of received values using the symbol numbers of the received waveform sections, to thereby obtain the received sequence of values.

38. The method of claim 35, wherein the step of processing further comprises:

comparing each received waveform section to a plurality of semantically encoded waveform patterns;

assigning a bit-pattern to the received waveform section based on the step of

comparing each received waveform section; and

generating a sequence of section values using the bit-pattern of the received waveform sections, to thereby obtain the received sequence of values.